#21
Appeal Brief
12-13-01
D. Bell

Serial No. 08/919,947

Docket No. 310030-234

PATENT

I certify that on November 4, 2001, which is the date I am signing this certificate, this correspondence and all identified attachments are being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents, Washington, D.C. 20231.

James A. Henricks

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application Of:	**RICHARD J. RICHARDSON**	Examiner:	**Ward, J.**
Serial Number:	08/919,947		
Filed:	August 29, 1997	Group Art Unit:	2875
Title:	LIGHTING CIRCUIT, LIGHTING SYSTEM METHOD AND APPARATUS, SOCKET ASSEMBLY, LAMP INSULATOR ASSEMBLY AND COMPONENTS THEREOF		

Commissioner for Patents
Washington, D.C. 20231

APPELLANT'S BRIEF

Sir:

Please consider the Appeal herein with the arguments set forth below, and reverse the rejections of claims 81-118.

1. Real Party in Interest.

Anthony, Inc. (Assignee)

2. Related Appeals and Interferences.

Appeal in Serial No. 09/069,457, filed April 28, 1998.

3. Status of Claims.

Pending: 81-108, 110-118. There is no claim numbered 109.

Objected to: None.

Rejected: 81-108, 110-118.

4. Status of Amendments.

No amendments have been filed since the Final Rejection.

5. Summary Of The Inventions.

The present inventions relate to lighting systems using electronic ballasts and to refrigerated display cases using such lighting circuits. For many years, commercial refrigerated display cases have used fluorescent lighting for illuminating product on shelves. Many such display cases used electromagnetic ballasts to drive the fluorescent lamps, but manufacturers began using electronic ballasts in order to save energy and space.

Electronic ballasts operate at higher voltages and frequencies to reduce flicker and noise and to more easily drive lamps at less than room temperature, including sub-ambient temperatures such as those encountered in refrigerated display cases, and the like. However, operating at higher voltages may produce a relatively high open circuit voltage, possibly as high as 750 volts, if there is a circuit failure, such as a lamp or socket failure. For example, an improperly connected lamp in its socket could lead to a high open circuit voltage, which in turn could cause arcing, over-heating, possible lamp failure and possible ballast failure. The higher voltage and higher frequency make the connections between the ballast and the lamp or bulb more important, as will be demonstrated more fully below.

Much of the hardware used with linear fluorescent lamps has been relatively standardized. Typically, linear fluorescent lamps have bi-pin contacts or double recessed contacts at each end of the fluorescent tube supported by and energized through contacts in a lamp socket. In one form of socket, commonly referred to as a tombstone socket (see FIG. 23, below), the pins of each end of the lamp are inserted sideways into the socket until the lamp is centered in each socket.

FIG. 23.
(PRIOR ART)

Conventional Tombstone Socket

After centering, the lamp is rotated about its longitudinal axis, allowing the pins to come into contact after rotation with the contacts in each socket. This socket design minimizes the possibility of one end of the lamp being inserted into one socket with subsequent energization of the lamp and the opposite, free end being live. A shock could result from a live free lamp end.

In the tombstone style of socket, contact and illumination of the lamp is achieved by electrical contact between part of the outer surface of each pin and a portion of the surface of the socket contact. However, the electrical contact for each pin occurs only over a relatively small surface area, estimated to be in some circumstances about around 0.00360 to 0.00370 square inches. As a result, any high current through the lamp results in a relatively higher current density at the pins, which the socket may not have been designed for. [Applicant's Specification, 2:25-4:4.] See also, *Kelman*, US Patent No. 2,522,044, FIGS. 1-9, 11.

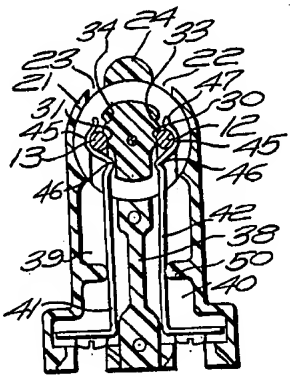


Fig. 4

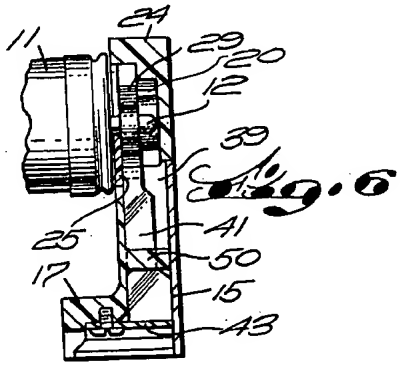


Fig. 6

Tombstone Style Socket of *KELMAN*, FIGS. 4 and 6

As shown in *Kelman*, the surface area of contact for the socket is relatively small, and there is no suggestion in *Kelman* as to the surface area of contact for the lamp.

It is believed that the small surface area of contact makes the conductivity in parts of the lighting circuit too low, possibly leading to ballast failure, even if an electrical connection, such as that between the lamp and its socket, has not failed. The characteristics of the ballast that make it vulnerable to overheating or failure are discussed more fully below.

Electronic ballasts used to drive fluorescent lamps are constant current devices, maintaining a constant current through the lamp under a variety of operating conditions. If, for some reason, the impedance of the lamp increases, the current will decrease unless the ballast maintains the current constant. In low temperature applications, the lamp exhibits a higher impedance, requiring a higher voltage to drive a current through the lamp to produce the desired light output. Additionally, as time passes, the light output gradually decreases and the impedance of the lamp may increase in such a way that the ballast tries to maintain the same current flow, thereby resulting in an increased voltage on the output of the ballast. The circuit may exhibit higher impedance also when the socket-lamp connection changes, such as may result from corrosion, contact separation, contact icing, and the like.

Higher impedance, as well as other differences or changes in the circuit from the optimum design, may lead to ballast overheating, as well as overheating of other circuit components, and possibly ballast or other circuit failure. [Specification, 7:19-8:15.] [See generally, Applicant's Specification, 5:9-28.] These problems may include ballast failure, component failure, and the like, which sometimes can lead to loss of equipment and even destruction of the fixture. The high voltages experienced in these lighting systems may lead to arcing between components, a phenomenon that has been observed, especially where there is inadequate or incomplete contact between components. Components have melted or failed entirely.

Consequently, it is believed important to reduce or minimize possible sources of variation of the circuit in such a way that, if anything, the lamp is the only component changing over time. Additionally, it is also believed to be important to match as closely as possible the components in the circuit to the ballast design so that the ballast does not overwork in trying to drive the lamp.

In order to improve a lighting circuit, such as may be used in refrigerated display cases, especially those for use with fluorescent lamps and/or electronic ballasts, components in the circuit are preferably designed to operate under the extremes of foreseeable circuit conditions for the circuit. Preferably, the components such as sockets 44 and 234 of the present inventions are capable of operating at the currents, voltages and frequencies of the circuits in which they are placed. In ordinary electromagnetic ballast and fluorescent lamp circuits, currents are in the milliamp and amp range, voltages in the 120 or 240 range and frequencies are line frequencies such as 60 or 50 Hz. With fluorescent lamps using electronic ballasts, the circuit connected to the ballast output sees voltages as high as 600 and 800 volts, currents as high as one or more amps, and frequencies as high as 130 or 160 kHz (kiloHertz). [See generally, Applicant's Specification, 3:1-11, and 53:15-25]

To that end, Applicant discloses an electronic ballast lighting system for a refrigerated display case that improves the operating characteristics of the lighting system. For example, the operating temperature of the ballast and/or associated components can be reduced, and the occurrence of such problems as ballast failure, lamp failure and component failure can be reduced in many instances as well. The lighting system can also provide a better matched lighting circuit less likely to lead to circuit breakdown or failure even at higher voltages provided by such electronic ballasts. [See, Applicant's Specification, p. 9, lines 17-24.]

In one aspect of the present inventions, a display case 200 has a lighting system using an electrical circuit including an electronic ballast 182 and a lamp socket 234 (see FIG. 16 below). The lighting system may be supported by a frame assembly 204, 206, 208, 210, and a mullion 212.

FIG. 16.

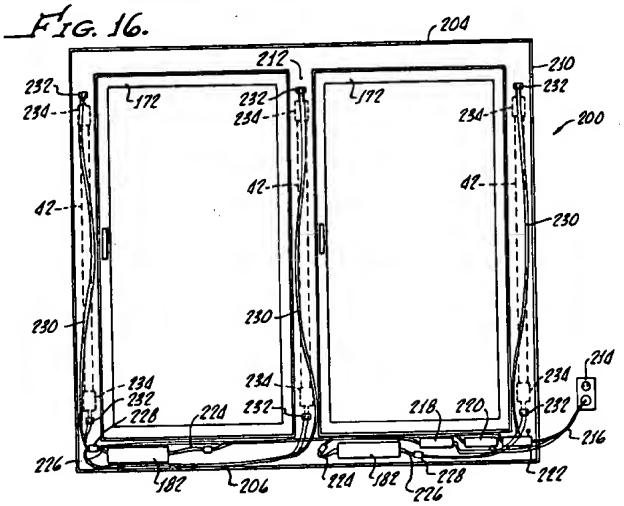
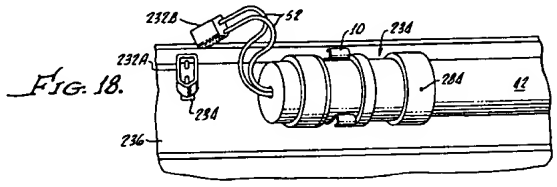


FIG. 18.



One Example of A Ballast Circuit

The electronic ballast typically operates by producing a high voltage and high frequency output from the line voltage at the input. For example, the ballast can produce an oscillating output signal as high as 60 or 160 kHz or more with an open circuit voltage as high as 600 or 800 volts. The ballast may be mounted adjacent a frame in the refrigerated display case.

The socket preferably includes contacts having a surface area available for electrical contact of at least 0.008 square inch. A junction allows wiring to releasably couple the ballast to the socket, and the junction also preferably has a surface area available for electrical contact of at least 0.008 square inch. In one preferred embodiment, the junction includes at least one pin connector and at least one mating hollow cylindrical connector enclosed in a plastic housing.

In a further aspect of one of the present inventions, the lamp socket preferably includes a surface area for contacting a contact on the fluorescent lamp of least 0.01 square inch, and in another embodiment at least 0.05 square inch or more. [See applicant's Specification, 14:2-8.] Higher surface areas of contact reduce the overall circuit resistance as seen by the ballast, and reduce the possibility of arcing between components during normal operation.

Considering one aspect of the present inventions in more detail with respect to FIGS. 16 and 18 above, each ballast includes a plurality of output conductors, preferably 16 or 14 gauge solid wire or better, at least one of which is a hot conductor and one of which is a neutral conductor. The output conductors are generally designated 226. The ballast wires 226

preferably terminate at one or more connectors 228 for providing a reliable, high conductivity, low impedance, low resistance and high current density-capable connection for supplying electrical energy to the rest of the lighting circuit. The connectors are preferably rated for the desired voltage, current and impedance or resistance to best match the circuit for the ballast and also to minimize any adverse electrical effect on the lighting circuit due to these components.

One mating half of the connector 228 is coupled to the ballast conductors 226 and the other mating half is coupled to mullion or frame conductors 230 forming part of the lighting circuit and for carrying electrical energy between the respective ballast and a respective lamp, described more fully below. The frame conductors 230 are in turn connected, in the preferred embodiment, to respective connectors 232, preferably having the same electrical characteristics as the connectors 228. While it is not necessary, each lamp preferably includes a panel-mounted connector 232 adjacent each end of the lamp (see FIG. 18 above) to facilitate installation and removal of the lamp and socket assembly. As shown in FIG. 18, one half of the connector or junction 232 is mounted through an opening 234 formed in a wall or panel 236 to which it is relatively rigidly mounted. The stationery part of the connector 232 is identified as 232A. The other half of the connector, identified as 232B, is coupled to the conductors 52 so that electrical energy can be supplied to the socket 234 for energizing the lamp 42.

The ballast 182, ballast conductor 226, ballast connector 228, frame conductor 230, frame connector 232, socket conductor 52, socket 234 and lamp 42, along with the complimentary components starting at the other end of the lamp form a lighting circuit for driving and illuminating the lamp. They are designed so as to minimize any load on the ballast that may cause the ballast to work harder to drive the lamp, and in one aspect of the present inventions, the junctions have a cross sectional area available for current flow of at least 0.008 inch square.

6. Issues.

1. Whether claims 81 and 89-91 are obvious over *Amstutz et al.* U.S. Patent No. 4,955,044, in view of *Pacholok*, US Patent No. 4,904,903.
2. Whether 82-88 and 92-99 are obvious over *Amtutz et al.* in view of *Kelman*, US Patent No. 2,522,044 and further in view of *Seok et al.*, US Patent No. 5,768,898.

3. Whether claims 100-108 and 110-118 are obvious over *Yoon et al.* US Patent No. 6,031,338, in view of *Robertson et al.* US Patent No. 5,904,415.

7. Grouping of Claims.

The claims of the groups to which the three rejections apply do not stand or fall together. The claims will be considered in the following groups, in the order of the issues set forth above:

Issue 1:

I. 81 (Independent)

II. 89

III. 90

IV. 91

Issue 2:

V. 82, 83, 88, 92

VI. 84

VII. 85

VIII. 86-87

IX. 93

X. 94-96

XI. 97-98

XII. 99

Issue 3:

XIII. 100-104, 116, 117 (100 is Independent)

XIV. 105

XV. 106

XVI. 107, 108

XVII. 110-111

XVIII. 112, 113

XIX. 114, 115

XX. 118 (Independent)

8. Argument

A. Introduction

Applicant will demonstrate below that a problem was discovered in electronic ballast circuits, especially those used in extreme environments such as refrigerated display cases. Applicant will also show that one solution to the problem was to insure adequate conduction of current or cross-sectional area for current flow in the lighting circuit, especially through junctions placed between the ballast and the lamp. Applicant will then demonstrate that the cited references fail to address any problem of circuit defects arising from electronic ballasts and junction integrity between the ballast and the lamp, and that the references fail to teach or suggest one or more of the elements of the claims on appeal. Applicant will also show that there is no teaching or suggestion to combine the references, and that any such combination would fail to result in the claimed inventions.

B. Discovery of Problem

"[A] patentable invention may lie in the discovery of the source of a problem even though the remedy may be obvious once the source of the problem is identified. This is part of the 'subject matter as a whole' which should always be considered in determining the obviousness of an invention under 35 U.S.C. Section 103." In re Sponnoble, 405 F.2d 578, 585, 160 USPQ 237, 243 (CCPA 1969). In the present case, electronic ballast failures were thought to be due to internal ballast circuit design. However, Applicant recognized that the circuit between the ballast and the lamp contributes to ballast problems, which recognition led to several aspects of the present inventions, including better lamp sockets and better circuit junctions. None of these problems are addressed in the prior art, and when considering the subject matter of the inventions as a whole, these facts weigh heavily in favor of patentability of these claims.

As noted in Applicant's specification, "It is also believed that inadequate connection and reduced conductivity in the lighting circuit may lead to lighting inefficiencies and possible ballast failure even before complete failure of an electrical connection, such as failure of the connection between the lamp and its socket. It is believed that the effect on the ballast of an inadequate connection results from a combination of the characteristics of the ballast and the characteristics of the lighting circuit. These characteristics will be discussed more fully below.

[See Applicant's Specification, 7:19-24.]" Those characteristics include the nature of the ballast itself and the lighting circuit components.

Ballasts are constant current devices and electronic ballasts achieve constant current at a high voltage and a high frequency. As noted above, as the circuit impedance increases, such as when the lamp ages, when the lamp is operated at less than the optimal temperature of 104 degrees, or when circuit junctions such as the lamp socket deteriorate as by corrosion or contact separation, the ballast adjusts accordingly. The result could be arcing in the circuit, overheating, or ballast failure. [Specification 8:1-15.]

In accordance with one aspect of one of the present inventions, lighting circuits using electronic ballasts are improved by increasing one or more of the cross-sectional area of contact of the junctions and of the wiring used to carry current from the ballast to the lamp. For example, the surface area of the socket for the coupling to the lamp pins is increased, and the surface area of a second junction between any wiring and the socket is increased. Additionally, if there is a third junction between the second junction and the ballast, the surface area of the connection is preferably increased. The surface area is preferably at least 0.008 inches square, but preferably more. In one embodiment, the junctions are formed from cylindrical and pin connectors allowing current flow over a substantial portion of the surface area of the junctions. The wiring between the ballast and the lamp is preferably at least 16 gauge.

C. The Rejections

Claims 81 and 89-91 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Amstutz et al.*, U.S. Patent No. 4,955,044, in view of *Pacholok*, U.S. Patent No. 4,904,903. Claims 82-88 and 92-99 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Amstutz et al.* in view of *Kelman*, U.S. Patent No. 2,522,044, and further in view of *Seok et al.*, U.S. Patent No. 5,768,898. Claims 100-118 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoon et al. U.S. Patent No. 6,031,338 in view of *Robertson et al.*, U.S. Patent No. 5,904,415. Each of the rejections will be discussed below with the claims rejected.

REJECTION 1

Amstutz et al. show a lighted display case having a ballast 44 and a socket and plug combination 107 and 105, respectively. As noted in *Amstutz et al.*, the basic construction of the display case is the same as that described in the co-pending application, which issued as U.S. Patent No. 4,886,327. [See, U.S. Patent No. 4,955,044, 3:28-32. Hereafter, citations will take the form of 'xxx:yy:z-zz, where "'xxx" are that last digits of the patent number, "yy" the column number of the cited text, and "zz" the line numbers.] Neither of the patents mentions electronic ballasts or the quality or surface area of any electrical components between the ballast and the lamp. Consequently, there is nothing in either of these references that would commend them to one of ordinary skill in the art to solve the problems solved by the present inventions.

Both patents teach a display case with a lighting system that is easier to make, and that facilitates quick and easy replacement of the display case panels. The '044 patent also shows a coupling assembly for releasably securing adjacent display cases together without marring or disfiguring the ends. ['044:1:59-64.] The ' 327 patent also mentions a lighting fixture having a separable rigid down-feed tube for electrical wiring extending from the base of the showcase to the lighting fixture. This allows the lighting fixture to be made and shipped separately from the display case, and also allows the wiring to be protected and hidden. ['327:3:4-43.] The patents say nothing about the characteristics of the lighting circuit, but instead focus on manufacturing and assembly concerns.

While both of the *Amstutz et al.* patents show plugs 112 (FIG. 5) and 140 (FIG. 14), there is no suggestion of enhanced plug/socket characteristics and there is no suggestion that the plugs and sockets have a relatively high surface area of contact. To the contrary, the only suggestion of the plug/socket characteristics shows that the surface area of contact is minimal. Specifically, the '327 patent states that the connectors 140 and 144 are vertically aligned "so that slight lateral movement of connector 144 to the left, as viewed in FIG. 14, will cause the connectors to engage." ['327:10:4-7, emphasis added.] This suggests only minimal contact between the two mating parts.

Moreover, the only suggestion about the lamp connection is found in the '044 patent, where the socket 98 appears to be a conventional tombstone socket. ['044:4:39-44.] As previously stated, conventional tombstone sockets appear to have surface areas for electrical

connection of about 0.003 in. square. Therefore, the *Amstutz et al.* references teach nothing that would suggest the present inventions, taken alone or in combination with any other reference of record.

In the rejection, the Examiner states that:

"Amstutz et al ('044) discloses in the prior art of record a lighted display case comprising of an integral frame work 16 (line 21 column 3), rear sliding doors 28 (line 23 column 3), a ballast 44 mounted to the bottom member 46 of the base portion 14 (line 49-50 column 3), a fluorescent tube socket extending downwardly from a subframe 101 (figure 19, 20), an electrical cord 36 and wiring assembly 38 (line 45-46 column 3)."

[Final Rejection, para. 3.] *Amstutz et al.*, however, fail to teach a lamp socket with improved surface area of contact, and fail to teach or suggest an enhanced contact surface area for the rest of the lighting circuit between the lamp and the ballast. *Amstutz et al.* also fail to teach an electronic ballast, indicating that *Amstutz et al.* are not even considering circuit problems that may arise from using electronic ballasts. Moreover, as will be demonstrated below, the secondary reference Pacholok fails to remedy these deficiencies.

Pacholok shows what is nominally referred to as an electronic ballast for high intensity discharge lamps, including fluorescent lamps. *Pacholok* describes circuits and methods for driving such lamps using short duration pulses which are terminated at the end of each cycle before any lamp damage occurs, with a frequency of anywhere from below 5 kHz to above 500 kHz. ['903:7:3-11 and '903:8:20-32.] Numerous circuit designs are described, but none normally operate above 200 volts. *Pacholok* mentions a test circuit using an adjustable power supply with a voltage range from zero to 200 volts, but does not appear to refer to any normal operation at any voltages higher than 100 volts (see the FIGS. 1b - 1m). The higher voltages appear to be no greater than 200 volts. *Pacholok* describes a test setup for observing the nature of dynamic arc resistance, and Applicant can find no indication of a lamp operating voltage other than about 100 volts. While it is noted that *Pacholok* induces a short pulse exceeding 1,000 volts, this is a pulse voltage used to start the lamp but the lamp is not operated at that voltage. There is no suggestion in *Pacholok* either of operating at greater than 100 volts or of any aspects of the claimed inventions. Moreover, there is no teaching or suggestion in any of the references that *Pacholok* can be combined with any of the other references of record. Additionally, for a number of the

Pacholok embodiments, it appears that the ballast design is appropriate only for selected lamp designs. [See,' 093: 9:34-36;' 093: 11: 12-15;' 093:11: 41-44.] Therefore, there is nothing in *Pacholok* commending itself to one of ordinary skill in the art for solving the problems solved by the present inventions, and there is no teaching or suggestion that these references could be combined.

To make a *prima facie* case of obviousness, the Examiner must do more than state "the mere fact that the prior art could be so modified" to arrive at the claimed invention. In re Gordon, 733 F. 2d at 902. "Properties must be considered in the overall evaluation of obviousness, and the lack of any disclosure of useful properties for a prior art [element] may indicate a lack of motivation to make related [elements]." In re Dillon, 919 F.2d 688, 698 (Fed. Cir. 1990). The Examiner may not "'pick and choose among the individual elements of assorted prior art references to recreate the claimed invention,' but rather, [the Examiner will] look for 'some teaching or suggestion in the references to support their use in the particular claimed combination.'" Symbol Technologies, Inc. v. Opticon, Inc., 935 F.2d. 1569, 1576 (Fed. Cir. 1991). "The prior art must provide a suggestion or motivation to make such a combination." Heidelberger, 21 F. 2d , 1072 (Fed. Cir. 19__).

There is no teaching or suggestion that *Pacholok* can be combined with *Amstutz et al.* and there is nothing in their properties that would motivate one to combine the references let alone in the way suggested by the Examiner. Not only do both of these references fail to address issues of lighting circuit integrity and junctions between the ballast and the lamp, *Amstutz et al.* teaches only display case construction while *Pacholok* teaches only ballast circuit design. Neither mentions the properties of sockets or other connections that could be used in lighting circuits. One patent has nothing to do with the other. There is no suggestion or motivation to make such a combination as required by the case law.

Moreover, even if *Amstutz et al.* and *Pacholok* could be combined, such a combination still lacks any teaching of circuit integrity, or any teaching of cross-sectional area of any junctions between the ballast and the lamp.

Consider now the claims rejected by the Examiner. While Applicants believe all the claims are separately patentable, only some of the claims are discussed separately here, in the groups identified above. The claims will be considered by group, taking the rejections in order.

Group I

Claim 81 recites in part::

"an electronic ballast . . . for operating . . . above 200 volts;

"at least one lamp socket supported relative to the frame and having socket contacts for supplying electrical energy to a lamp having cylindrical contacts through the socket contacts, wherein the socket contacts have a surface area available for electrical contact of at least 0.008 square inch;

"at least one electrical conductor for electrically coupling the ballast to the socket, wherein the conductor has a surface area available for electrical contact of at least 0.008 square inch; and

"a junction between the at least one electrical conductor and the contacts of the at least one lamp socket for forming an electrical bridge between the at least one electrical conductor and the contacts wherein the bridge has a surface area available for electrical contact of at least 0.008 square inch."

Even if *Amstutz et al.* and *Pacholok* can be combined, both *Amstutz et al.* and *Pacholok* lack any teaching of contact surface areas, and certainly lack any teaching of the recited contact surface areas of at least 0.008 square inch. For the lamp connection, *Amstutz et al.* teaches only a conventional tombstone socket, estimated to have a surface area for electrical contact of about 0.003 square inch, and *Pacholok* teaches nothing at all about contacts. While *Amstutz et al.* refers to "sockets", the '327 *Amstutz et al.* patent teaches only a minimal electrical contact in the lighting circuit. Moreover, even if the sockets 112 and 140 in *Amstutz et al.* '327 have a different contact cross-sectional area than the lamp socket, the lamp socket shown in *Amstutz et al.* '044 is still a low contact surface area tombstone socket. Clearly claim 81 is patentable over *Amstutz et al.* and *Pacholok* taken singly or in combination.

Group II

Claim 89 recites in part::

> "a first electrical conductor for supplying electrical energy to a first contact in the at least one lamp socket, a second electrical conductor for supplying electrical energy to a second contact in the at least one lamp socket, and wherein the first conductor is soldered to the first contact and wherein the second conductor is soldered to the second contact."

Even if *Amstutz et al.* and *Pacholok* can be combined, no mention can be found in either reference of soldering contacts, let alone soldering contacts in a lamp socket.

Group III

Claim 90 recites in part:

> "the junction includes at least one pin connector and at least one mating hollow cylindrical connector and wherein the connectors are enclosed in a plastic housing."

Even if *Amstutz et al.* and *Pacholok* can be combined, there is no suggestion in either reference of a junction having a pin connector and a hollow mating cylindrical connector wherein the connectors are enclosed in a plastic housing. While *Amstutz et al.* shows plugs and sockets, there is no teaching or suggestion of any pin connector or hollow mating cylindrical connector.

Group IV

Claim 91 recites in part:

> "the contacts for the at least one lamp socket are substantially circular in cross section."

Even if *Amstutz et al.* and *Pacholok* can be combined, there is no suggestion in either reference of contacts for a lamp socket that are substantially circular in cross-section. In fact, the teaching of *Amstutz et al.* is for a tombstone socket, which typically has at most an arcuate contact surface.

REJECTION 2

Claims 82-88 and 92-99 are rejected as being allegedly obvious over *Amstutz et al.* in view of *Kelman* and further in view of *Seok et al.* Here again, *Amstutz et al.* is the primary reference, and has been previously discussed and shown to be deficient. *Kelman* and *Seok et al.* are also deficient, and the Examiner has mischaracterized *Kelman* in the process of rejecting these claims. *Kelman* shows a conventional fluorescent light socket of the tombstone style, having arcuate contact surfaces. These sockets are prone to the arcing or over-heating problems encountered in lighting systems. There is no suggestion in *Kelman* of the contact surface area.

The Examiner states that *Kelman* shows a longitudinal connection movement with a lamp 11. However, as described in the text corresponding to FIG. 3, "the blade contact fingers are urged towards the sides of the recess 19 to clear the way for the insertion of the fluorescent tube pins and to not be contacted by the pins." ['044: 3:25-28.] Therefore, no electrical contact is made through a longitudinal connection movement.

The Examiner also states that *Kelman* shows a hollow-cylindrical shape for accepting a lamp pin contact, citing FIG. 1, that *Kelman* shows covering a lamp pin by at least 50 percent, citing FIG. 5, that it shows a split sleeve contact that can be soldered, citing FIGS. 6 and 11, that it shows pins engaging a lamp over at least 180 degree of the circumferential surface of the lamp pins, citing column 3, lines 50-53. None of these elements are shown in *Kelman*.

Nothing in *Kelman*, FIG. 1 or otherwise, shows a hollow cylindrical shape for accepting a lamp pin contact. Also, nothing in *Kelman* shows any covering of a lamp pin by at least 50 percent, and FIG. 5 fails to even show a lamp pin. Furthermore, nothing in *Kelman* shows a split sleeve contact, and nothing has been found in *Kelman* referring to solder. Additionally, nothing in *Kelman* shows pins engaging a lamp over at least a 180 degree circumference surface of a lamp pin. The text cited by the Examiner relating to 180 degrees refers to rotating a lamp within the socket in order to engage the lamp with the socket or to release the lamp from the socket. In view of the foregoing, the Examiner has failed to make a *prima facie* case of obviousness by relying on *Kelman*. Therefore, claims 82-88 and 92-99 should be patentable without more.

The Examiner asserts that the surface area of electrical contact is a design choice and the use of 16 gauge wire is obvious. In the inventions taken as a whole, the surface area electrical contact is not a matter of design choice. Applicant found that problems arise in lighting circuits

using electronic ballasts, and those problems have never before been addressed. The Examiner cites no reference dealing with electronic ballasts and lighting circuit problems. Moreover, the existence of ballast failures does not indicate a solution, let alone any suggestion that surface areas of electrical contact should be improved. Significantly, the Examiner's reliance on design choice to support obviousness is an acknowledgement that none of the art teaches or suggests Applicant's claimed inventions. Additionally, the Examiner has failed to cite any reference teaching or suggesting the obviousness of using 16 gauge wire as claimed.

Consider now the claims as rejected by the Examiner in the second rejection. The claims will be considered by group.

Group V

All of the claims in this group, namely claims 82, 83, 88 and 92, are rejected based on *Kelman*. Therefore, these claims should be patentable without more. However, note claim 88 reciting in part "wherein each lamp socket includes hollow cylindrical contacts for engaging pins on the lamp." Note also claim 92 reciting in part "wherein the contacts are split sleeve contacts." The *Amstutz et al., Kelman* and *Seok et al.* references fail to teach or suggest the claim elements or the claimed combinations.

Group VI

Claim 84 recites in part "wherein the contact of the at least one lamp socket is adapted to contact with a mating contact through a longitudinal connection movement." *Kelman* specifically states that the movement referred to buy the Examiner keeps the lamp pins out of contact with the socket contacts. Therefore, the Examiner has not made a *prima facie* case of obviousness.

Group VII

Claim 85 recites in part:

> "contacts for the at least one lamp socket are at least partially hollow cylindrical for accepting a complimentary pin contact, wherein the at least one electrical conductor includes wire having a size no smaller than 16 gauge, and wherein the

junction includes a connector having a pin connector portion and a complementary mating hollow cylindrical connecting portion, and further including a lamp with pins electrically contacting the contacts on the at least one lamp socket."

None of the references teach or suggest the form of lamp contact, other than *Kelman*. *Kelman* shows only curved contact fingers 45 having bends 46. *Kelman* does not teach or suggest any hollow cylindrical contact either in a lamp contact or in a junction. Moreover, none of *Amstutz et al.*, *Kelman* or *Seok et al.*, taken singly or in combination, teach or suggest any of the elements of claim 85 or the combination.

Group VIII

Claims 86 and 87 recite in part "wherein the contacts of the at least one lamp socket engage the lamp pins over at least 180 degrees of the circumferential surface of the lamp pins." None of the references teach or suggest this combination or this element of the combination. The contact with a lamp pin in *Kelman* is significantly less than 180 degrees in circumference.

Group IX

Claim 93 recites in part "a ballast capable of operating at temperatures below zero degrees Farenheit." Of the references relied upon by the Examiner, only *Yoon et al.* refers to operation below zero degrees. However, the Examiner does not rely on *Yoon et al.* in rejecting claim 93.

Group X

Claims 94-96 recite in part "wherein the at least one socket contact for the fluorescent lamp includes a surface area for contacting a contact on the fluorescent lamp having at least 0.01 square inch surface area available for electrical contact with the contact on the fluorescent lamp." None of the references teach or suggest solving problems in lighting circuits using electronic ballasts, and none teach or suggest a surface area for contact of at least 0.01 square inch. Each claim, taken as a whole, is patentable over the prior art.

Group XI

Claims 97-98 recite in part "wherein the junction includes pin conductors engaging hollow cylindrical mating conductors surrounded . . . ." As noted above, *Kelman* fails to teach or suggest hollow cylindrical contacts. *Amstutz et al.* also fails to teach or suggest the form of the sockets between the ballast and the tombstone socket. Therefore, none of the prior art taken singly or in combination teaches or suggests the claimed combinations.

Group XII

Claim 99 recites in part "wherein the at least one electrical conductor for electrically coupling the ballast to the socket is no smaller than 16 gauge wire." The Examiner has failed to cite any reference or combination of references teaching or suggesting the claimed element separately or taken as a whole with the claimed combination.

REJECTION 3

Claims 100-118 are rejected under 35 U.S.C. 103(a) as being allegedly unpatentable over *Yoon et al.* in view of *Robertson et al.* *Yoon et al.* is directed to an electronic ballast that can operate at a given output with a number of different input voltage levels, and one that uses a start signal for a power factor circuit to boost voltage after the load for the ballast has already had a current applied to it. *Yoon et al.* is directed to the internal ballast circuit and is not concerned with lamp sockets, circuit junctions or the like.

Yoon et al. teach a ballast for, among other things, a lighting system in a refrigerated display case. *Yoon et al.* fails to teach or suggest a socket for a light source, current carrying conductors having specified surface areas available for contact, which the Examiner acknowledges, or releasable junctions between the conductor and a socket, which the Examiner fails to acknowledge.

Robertson et al. teaches a fluorescent bulb connector assembly for securing a short fluorescent lamp into a lighting fixture designed for longer lamps. The connector has lamp pin openings at one end to receive pins of the lamp and connector pins at the other end of the connector for engaging the sockets of the light fixture. *Robertson et al.* is concerned only with retrofitting shorter bulbs into existing fixtures, and teaches nothing about the existing fixtures or

the circuit between the fixture and any ballast. Therefore, not only are *Yoon et al.* and *Robertson et al.* unable to be combined, any such combination fails to teach or suggest the claimed inventions.

Most significantly, between *Yoon et al.* and *Robertson et al.*, the Examiner has completely failed to identify any component in either of those references or in any purported combination of those suggesting a junction between a lamp socket and ballast conductors. Therefore, the Examiner has failed to make a *prima facie* case of obviousness and has failed to make a *prima facie* showing that these references can be combined. Moreover, the Examiner has failed to identify in those references, taken singly or in combination, features of the junction specifically claimed in the application.

Consider now claims rejected in Rejection 3. The claims will be taken in the order of their group.

Group XIII

Claims 100-104, 116 and 117 are directed to a display case and recite in part:

> "at least one socket for the light source supported relative to the frame and having socket contacts for supplying electrical energy to the light source through the cylindrical contacts and the socket contacts, wherein the socket contacts have a surface area available for electrical contact of at least 0.008 square inch;
>
> "a conductor for carrying current wherein the conductor has a surface area available for electrical contact of at least 0.008 square inch;
>
> "a ballast electrically coupled to the conductor, the ballast configured for operating at a frequency above 100 cycles per second and above 200 volts; and
>
> "a releasable junction between the at least one electrical conductor and the contacts of the at least one socket for forming an electrical bridge between the at least one electrical conductor and the contacts wherein the bridge has a surface area available for electrical contact of at least 0.008 square inch."

None of the references, taken singly or in combination, teach or suggest the claimed elements or the claimed combination. Even if *Yoon et al.* and *Robertson et al.* could be combined, their combination would not teach or suggest the claimed display case. None of the references teach

or suggest a conductor for carrying current wherein the conductor has a surface area available for electrical contact of at least 0.008 square inch. Moreover, none of the references teach or suggest a releasable junction between the at least one electrical conductor and the contacts of the least one socket, or a surface area in the releasable junction available for electrical contact of at least 0.008 square inch. The Examiner has entirely ignored the releasable junction and its characteristics. The Examiner has also ignored the surface area characteristics of the claimed circuit, and therefore has failed to take into account the claimed invention as a whole.

Group XIV

Claim 105 recites in part "wherein the releasable junction is positioned on the same side of the mullion as the light source." Nothing in any combination of *Yoon et al.* and *Robertson et al.* teaches or suggests a releasable junction positioned on the same side of the mullion as the light source.

Group XV

Claim 106 recites in part "wherein the releasable junction has one portion that is integral with the at least one socket." Nothing in any combination of *Yoon et al.* and *Robertson et al.* teaches or suggests a releasable junction where one portion is integral with a socket.

Group XVI

Claims 107 and 108 recite in part "wherein the releasable junction includes a housing surrounding a portion of the at least one electrical conductor." Nothing in any combination of *Yoon et al.* and *Robertson et al.* teaches or suggests a releasable junction having a housing surrounding a portion of the at least one electrical conductor.

Group XVII

Claims 110 and 111 recite in part "wherein the at least one light source is also mounted to the frame and wherein the conductor extends from the ballast along a first part of the frame and through an opening in the frame to the at least one socket." Nothing in any combination of *Yoon et al.* and *Robertson et al.* teaches or suggests the claimed combination.

Group XVIII

Claims 112 and 113 recite in part "the releasable junction includes a cylindrical pin and a mating cylindrical sleeve." Nothing in any combination of *Yoon et al.* and *Robertson et al.* teaches or suggests the claimed combination.

Group XIX

Claims 114 and 115 recite in part wherein a "ballast connector has a surface area available for electrical contact of at least 0.008 square inch." Nothing in any combination of *Yoon et al.* and *Robertson et al.* teaches or suggests the claimed combination. The Examiner has failed to identify any structure that would correspond to a ballast connector.

Group XX

Claim 118 is an independent apparatus claim and recites in part::

> "a first socket . . . wherein the first socket includes socket contacts having a surface area available for electrical contact of at least 0.05 square inch;
>
> "a second socket . . . wherein the second socket includes socket contacts having a surface area available for electrical contact of at least 0.05 square inch;
>
> "a frame conductor for carrying current wherein the frame conductor has a surface area available for electrical contact of at least 0.05 square inch;
>
> "a ballast electrically coupled to the frame conductor and configured for operating at a frequency above 100 cycles per second and above 200 volts; and
>
> "a releasable junction between the at least one frame conductor and the first socket contacts for forming an electrical bridge between the at least one

frame conductor and the first socket contacts wherein the bridge has a surface area available for electrical contact of at least 0.05 square inch."

The Examiner has failed to identify any structure teaching or suggesting the claimed combination. The Examiner has also failed to identify any structure teaching more suggesting a frame conductor as recited, a releasable junction as recited, or contact surface areas as recited. The Examiner has failed to make a *prima facie* case of obviousness as to claim 118.

9. Appendix.

Appealed claims 81-108 and 110-118.

Please charge any additional fees that may be due or credit any overpayments to our deposit Account No. 50-0655.

Respectfully submitted,

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APPENDIX OF CLAIMS (81-108 and 110-118)

81. A refrigerated display case comprising:

a frame element;

at least one door supported relative to the frame element;

an electronic ballast mounted adjacent the frame for operating at a frequency above 100 cycles per second and above 200 volts;

at least one lamp socket supported relative to the frame and having socket contacts for supplying electrical energy to a lamp having cylindrical contacts through the socket contacts, wherein the socket contacts have a surface area available for electrical contact of at least 0.008 square inch;

at least one electrical conductor for electrically coupling the ballast to the socket, wherein the conductor has a surface area available for electrical contact of at least 0.008 square inch; and

a junction between the at least one electrical conductor and the contacts of the at least one lamp socket for forming an electrical bridge between the at least one electrical conductor and the contacts wherein the bridge has a surface area available for electrical contact of at least 0.008 square inch.

82. The display case of claim 81 wherein the contacts for the at least one lamp socket are at least partially cylindrical for accepting a pin for electrical contact.

83. The display case of claim 81 wherein the contacts for the at least one lamp socket have an arcuate shape over a substantial surface area for contact with a mating electrical contact.

84. The display case of claim 81 wherein the contact of the at least one lamp socket is adapted to contact with a mating contact through a longitudinal connection movement.

85. The display case of claim 81 wherein the contacts for the at least one lamp socket are at least partially hollow cylindrical for accepting a complimentary pin contact, wherein the at least one electrical conductor includes wire having a size no smaller than 16 gauge, and wherein the junction includes a connector having a pin connector portion and a complementary mating hollow cylindrical connecting portion, and further including a lamp with pins electrically contacting the contacts on the at least one lamp socket.

86. The combination of claim 85 wherein the contacts of the at least one lamp socket engage the lamp pins over at least 180 degrees of the circumferential surface of the lamp pins.

87. The display case of claim 86 wherein the contacts on the at least one lamp socket engage the pins on the lamp over at least 50 per cent of the length of the pins on the lamp.

88. The display case of claim 81 further including a fluorescent lamp connected to two lamp sockets, wherein each lamp socket includes hollow cylindrical contacts for engaging pins on the lamp.

89. The display case of claim 81 further comprising a first electrical conductor for supplying electrical energy to a first contact in the at least one lamp socket, a second electrical conductor for supplying electrical energy to a second contact in the at least one lamp socket, and wherein the first conductor is soldered to the first contact and wherein the second conductor is soldered to the second contact.

90. The display case of claim 81 wherein the junction includes at least one pin connector and at least one mating hollow cylindrical connector and wherein the connectors are enclosed in a plastic housing.

91. The display case of claim 81 wherein the contacts for the at least one lamp socket are substantially circular in cross section.

92. The display case of claim 91 wherein the contacts are split sleeve contacts.

93. The display case of claim 81 further including a ballast capable of operating at temperatures below zero degrees Farenheit.

94. The display case of claim 81 further comprising a lamp coupled to the at least one lamp socket, wherein the lamp is a fluorescent light source and wherein the at least one socket contact for the fluorescent lamp includes a surface area for contacting a contact on the fluorescent lamp having at least 0.01 square inch surface area available for electrical contact with the contact on the fluorescent lamp.

95. The display case of claim 94 wherein the surface area available for electrical contact with the lamp is at least 0.05 square inch.

96. The display case of claim 94 wherein the electrical circuit is formed in such a way that the surface area available for electrical contact with the lamp is approximately 0.07 square inch.

97. The display case of claim 81 wherein the at least one electrical conductor for electrically coupling the ballast to the socket includes a connection for connecting to a conductor carrying electrical energy from a ballast wherein the junction includes pin conductors engaging hollow cylindrical mating conductors surrounded by plastic.

98. The display case of claim 97 wherein the at least one electrical conductor for electrically coupling the ballast to the socket is connected to a junction formed from a plastic enclosed pin conductor engaging a hollow cylindrical conductor.

99. The display case of claim 97 wherein the at least one electrical conductor for electrically coupling the ballast to the socket is no smaller than 16 gauge wire.

100. A refrigerated display case comprising:

a frame for defining an area to be refrigerated;

at least one product support within the area to be refrigerated, the product support positioned within the area to be refrigerated so that at least part of any product supported on the support can be seen from outside the refrigerated display case;

a light source supported relative to the frame so as to illuminate product on the product support, the light source including cylindrical contacts;

at least one socket for the light source supported relative to the frame and having socket contacts for supplying electrical energy to the light source through the cylindrical contacts and the socket contacts, wherein the socket contacts have a surface area available for electrical contact of at least 0.008 square inch;

a conductor for carrying current wherein the conductor has a surface area available for electrical contact of at least 0.008 square inch;

a ballast electrically coupled to the conductor, the ballast configured for operating at a frequency above 100 cycles per second and above 200 volts; and

a releasable junction between the at least one electrical conductor and the contacts of the at least one socket for forming an electrical bridge between the at least one electrical conductor and the contacts wherein the bridge has a surface area available for electrical contact of at least 0.008 square inch.

101. The display case of claim 100 wherein the light source is supported by a support mounted to the frame.

102. The display case of claim 101 wherein the support is a mullion and wherein the light source is releasably fixed to the mullion.

103. The display case of claim 102 wherein the ballast is supported by the mullion.

104. The display case of claim 103 wherein the conductor for carrying current extends within the mullion.

105. The display case of claim 103 wherein the releasable junction is positioned on the same side of the mullion as the light source.

106. The display case of claim 101 wherein the releasable junction has one portion that is integral with the at least one socket.

107. The display case of claim 101 wherein the releasable junction includes a housing surrounding a portion of the at least one electrical conductor.

108. The display case of claim 107 wherein the at least one socket includes a connector coupled to at least one socket contact and wherein the socket includes a connector housing surrounding a portion of the connector for engaging the housing on the releasable junction.

109. No claim.

110. The display case of claim 100 wherein the ballast is supported by the frame and wherein the at least one light source is also mounted to the frame and wherein the conductor extends from the ballast along a first part of the frame and through an opening in the frame to the at least one socket.

111. The display case of claim 110 wherein the opening is adjacent the at least one socket.

112. The display case of claim 100 wherein the releasable junction includes a cylindrical pin and a mating cylindrical sleeve.

113. The display case of claim 112 wherein the pin and sleeve make electrical contact over at least 180 degrees of circumference around the cylindrical pin.

114. The display case of claim 100 wherein the conductor is a frame conductor and further comprising a ballast connector for connecting a ballast conductor to the frame conductor, and wherein the ballast connector has a surface area available for electrical contact of at least 0.008 square inch.

115. The display case of claim 114 wherein the ballast connector, the releasable junction, the frame conductor and the at least one socket each have surface areas of contact available for electrical contact of at least 0.05 square inch.

116. The display case of claim 100 wherein the at least one socket has socket contacts having a circumference and wherein the at least one socket includes an insulating portion encircling the circumference of the socket contacts.

117. The display case of claim 116 wherein the socket contacts have respective lengths and wherein the insulating portion has a length greater than the lengths of the socket contacts.

118. A refrigerated display case comprising:

a frame defining a refrigerated enclosure;

at least one door movably supported by the frame for closing an opening in the frame and for allowing selective access to the refrigerated enclosure;

at least one product support within the refrigerated enclosure on the product support can be seen from outside the display case;

a lamp having first and second ends supported by the frame to illuminate product on the product support;

a first socket on a first end of the lamp for providing electrical energy to the lamp, wherein the first socket includes socket contacts having a surface area available for electrical contact of at least 0.05 square inch;

a second socket on the second end of the lamp for providing electrical energy to the lamp, wherein the second socket includes socket contacts having a surface area available for electrical contact of at least 0.05 square inch;

a frame conductor for carrying current wherein the frame conductor has a surface area available for electrical contact of at least 0.05 square inch;

a ballast electrically coupled to the frame conductor and configured for operating at a frequency above 100 cycles per second and above 200 volts; and

a releasable junction between the at least one frame conductor and the first socket contacts for forming an electrical bridge between the at least one frame conductor and the first socket contacts wherein the bridge has a surface area available for electrical contact of at least 0.05 square inch.